

motions of their own) in about fourteen days and disappear at the western limit: they are limited in situation to two zones (a northern and a southern) parallel to the solar equator. Sometimes the same spot reappears when a revolution is completed, and sometimes does not return, another taking its place—the average life of a spot being two or three months, the longest on record showing a duration of eighteen months. They usually are present not singly but in groups, and each appears to possess an individual character of development and decay. The depth of a spot or depression below the level of the photosphere has been estimated at from 2000 to 6000 miles. There can be no doubt that they do not consist of clouds floating above the sun's luminous surface, but are definitely attached to the surface itself, and hence, from this connection, they are necessarily involved in the fiery tempests which periodically convulse that orb. Irregular in shape, their dimensions vary considerably, and the extent of their possibilities of influence upon the earth may be measured by the fact that in 1858 a spot opened with a diameter of 144,000 miles, capable therefore of easily engulfing eighteen of our earths side by side; a spot possessing a diameter of 30,000 miles would be considered large. The centre of each hollow or spot appears to be extremely dark compared with the brilliancy of the photosphere of which it forms a rent, and surrounding each central portion is an edging of lighter shade. The result of protracted observations upon the sun accordingly shows : (1) that the photosphere—the source of our terrestrial heat and light, and consequently of all material and mental energy—remains for a period in a comparatively quiescent and unbroken condition; then (2) the internal equilibrium of the sun is ruptured by the outburst of deep-lying forces which had been gathering intensity of action, and which tear the surface into spacious holes.; and (3) as the violence of this storm of fire subsides into calm, the photosphere regains its even and continuous form.

Now the peculiarity of these aspects with which we are concerned resides in

the fact of their periodic nature. The area of spots (attesting to this internal commotion) attains a maximum, when the spots or cavities are abundant and exten-